CLAIMS

1. A digitizing pen, comprising:

a pen body with a writing tip for handwriting on a sheet of paper;

an optical sensor for imaging a writing surface of said sheet of paper and that is disposed in the pen body;

a tag-recognition reader connected to the optical sensor, and for gathering location information from data encoded on at least one tag positioned on said writing surface;

a velocity reader connected to the optical sensor, and for gathering speed and relative direction information of said writing tip over said writing surface; and

a processor connected to receive said tag location, writing-tip speed, and writing-tip relative direction information, and for computing a series of locations on said writing surface visited by said writing tip.

2. The pen of claim 1, wherein:

the optical sensor comprises an optical reader, a light, an array of photodetectors and a processor;

the light providing, at a grazing angle, a source of light on or below the tip;

the optical reader collecting reflected light from the light and focusing it on the photodetectors;

the photodetectors adapted to capture surface features and produce a sequence of digital frames corresponding to those features; and

the processor being adapted to yield location information by comparing frames from the sequence.

3. The pen of claim 1, wherein:

the tip further comprises a ball for depositing ink; and

the processor obtains a sequence of images of an ink surface on the ball and extracts location information from the sequence.

4. A method for digitizing a path having an initiation point and termination point, the path created by the movement of a pen tip over a surface printed with tags encoded with data, the method comprising the steps of:

capturing instances of tag data by using an optoelectronic tag sensor carried by the pen;

obtaining location information between the instances by using a position-locating system carried by the pen; and

combining tag data and location information to construct a digital representation of the path.

5. The method of claim 4, wherein:

determining the initiation point and termination point of a path is interpolated and extrapolated from tag data.

6. The method of claim 4, wherein:

the position-locating system is an optical reader comprising an optical reader, a light, an array of photodetectors and a processor.

7. The method of claim 4, wherein:

the tip further comprises a ball for depositing ink; and

the position-locating system obtains a sequence of images of an ink surface on the ball and extracts the location information from the sequence.

8. A method for capturing a signature created by the movement of a pen tip over a surface printed with tags encoded with data, the method comprising the steps of:

capturing instances of tag data by using an optoelectronic tag sensor carried by the pen;

obtaining location information between the instances by using a position-locating system carried by the pen;

combining tag data and location information to construct a digital representation of the path.

9. The method of claim 8, wherein:

determining the initiation point and termination point of the path is done by using the position-locating system or tag data.

10. The method of claim 8, wherein:

the position-locating system is an optical reader comprising an optical reader, a light, an array of photodetectors and a processor.

11. The method of claim 8, wherein:

the tip further comprises a ball for depositing ink; and

the position-locating system obtains a sequence of images of an ink surface on the ball and extracts the location information from the sequence.

12. The pen of claim 2, wherein:

the light provides a source of coherent light and the position-locating system captures surface features by detecting specular reflection.

13. The pen of claim 2, wherein:

the grazing angle is 5 to 20 degrees.

14. The pen of claim 2, wherein:

tag data and location information are transmitted from the pen to a user's computer over a wireless network.

15. The method of claim 4, wherein:

the light provides a source of coherent light and the position-locating system captures surface features by detecting specular reflection.

16. The method of claim 8, wherein:

the light provides a source of coherent light and the position-locating system captures surface features by detecting specular reflection.

17. A pen and printer for capturing a digital record of a pen's location on a paper, comprising:

a digitizing pen having a surface contacting tip, an optical tag sensor for capturing tag data, a position-locating system for providing location information between tags, the pen also having transmission hardware for supplying tag data and location information to a computer; and

a printer for adding tags onto an already printed surface, which tags can be read by the pen but not by the naked eye.

18. The pen and printer of claim 17, wherein:

the position-locating system is an optical reader comprising an optical reader, a light, an array of photodetectors and a processor;

the light providing, at a grazing angle, a source of light on or below the tip;

the optical reader collecting reflected light from the light and focusing it on the photodetectors;

the photodetectors adapted to capture surface features and produce a sequence of digital frames corresponding to those features; and

the processor being adapted to yield location information by comparing frames from the sequence.

19. The pen and printer of claim 17, wherein:

the tip further comprises a ball for depositing ink; and

the position-locating system obtains a sequence of images of an ink surface on the ball and extracts location information and path information from the sequence.

20. The pen and printer of claim 17, wherein:

the path information comprises an initiation point and a termination point and the initiation point and the termination point of the path are determined from data provided by the position-locating system.